

Social Exclusion, Expressive Writing, and Working Memory Capacity

The Mechanisms Underlying the Effects of
Social Exclusion on Working Memory Capacity

Honors Research Thesis

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Abstract

Social exclusion has negative effects on cognitive and social functioning (Baumeister et al, 2002), such as working memory capacity (Mischkowski & Crocker, under revision). Expressive writing is a therapy intervention proven to have various physical and mental health benefits (Frattaroli, 2006), including improved working memory capacity (Klein & Boals, 2001). I propose that expressive writing can alleviate the negative effects of a social threat, specifically the effects of social exclusion on working memory capacity. I tested this hypothesis by manipulating social exclusion and expressive writing and measuring their effects on working memory capacity. Additionally, I measured motivation and rumination as potential process variables. I found that expressive writing alleviates the effects of social exclusion on working memory capacity. These findings suggest that expressive writing can alleviate the deleterious effects of social exclusion.

Introduction

Social exclusion can be defined as “being kept apart from others” (Williams, 2007), and may result in decreased prosocial behavior (Twenge, Baumeister, DeWall, Ciarocco, Bartels, 2007), lower performance on intellectual tasks (Baumeister & DeWall, 2005; Williams, 2007), aggressive behavior (Buckley, Winkel, & Leary, 2004; Twenge, Baumeister, Tice, & Stucke, 2001), and impaired intellectual performance (Baumeister, Twenge, & Nuss, 2002). Researchers propose a variety of mechanisms to explain the negative effects of social exclusion, such as threats to belongingness and control (Twenge et al., 2007), reduced effort and self awareness in response to exclusion (Baumeister, DeWall, Ciarocco, & Twenge, 2005; DeWall, Baumeister, & Vohs, 2008), reduced empathetic feelings (Twenge, Baumeister, et al. 2007), increased sensitivity to social cues (Pickett & Gardner, 2005), or hostile cognitive bias (DeWall, Twenge, Gitter, & Baumeister, 2009). Mischkowski and Crocker (under revision) found that working memory capacity (WMC) accounts for some of the negative effects of social exclusion on cognitive performance and prosocial behavior. Could an intervention alleviate the negative effects of social exclusion on WMC? What other variables influence the relationship between social exclusion on WMC?

Working Memory Capacity

Working memory is the limited capacity to devote mental resources to task oriented goals (Engle, 2002). Working memory is the ability to focus one’s attention on task-relevant goals while simultaneously ignoring task-irrelevant information. During complex cognitive and social tasks, working memory enables people to temporarily store and manipulate information relevant to the task at hand. This attention control and the

storage and manipulation of information are grouped together as working memory capacity, or WMC for short (Engle, 2002; Hoffman, Friese, Schmeichel, & Baddeley, 2010).

WMC is a key variable in regulating attention for cognitive and social tasks (Barret, Tugade, & Engle, 2004). Individual differences in WMC predict a variety of cognitive abilities and skills, such as the ability to inhibit proactive interference (Kane & Engle, 2000), and the ability to suppress mind-wandering and unwanted thoughts (Brewin & Beaton, 2002; Brewin & Smart, 2005; Kane, et al., 2007). Social exclusion impairs intellectual performance (Baumeister, et al. 2002) and prosocial behavior (Twenge, Baumeister, et al., (2007), which is explained through social exclusions effects on WMC (Mischkowski & Crocker, 2013). WMC is a basic underlying mechanism that explains the diversity of exclusion's effects on cognitive performance and social behaviors.

Expressive Writing

Expressive writing generally refers to an intervention that uses written emotional disclosure as a means to reconstrue and provide meaning to a threat or trauma, primarily used within a clinical setting. This fosters insight and closure (Pennebaker & Beall, 1986). Multiple meta-analyses found that expressive writing has mental and physical health benefits (Frattaroli, 2006; Frisina, Barod, & Lepore, 2004). Expressive writing leads to better psychological well-being (Lepore, 1997; Murray & Segal, 1994) and reduces the negative emotional and physiological impact of intrusive thoughts (Lepore & Greenberg, 2002). Expressive writing improves WMC (Klein & Boals, 2001) and benefits those who have recently suffered from the social trauma of a romantic break-up

(Lepore & Greenberg, 2002), suggesting that an expressive writing intervention would provide benefits after social exclusion.

While the majority of expressive writing interventions typically occur over a longer period of time with multiple instances of writing, a short and early intervention may also prove to have beneficial effects. In the original Pennebaker and Beall (1986) study, participants wrote for about 15 minutes a day over four consecutive days. Some studies suggest that spreading out the days further can produce better results (Smyth, 1998), whereas other studies have found effects after a single writing session (Greenberg et al., 1996). Most of these studies took place in clinical settings and focused on clinical topics, such as depressive symptoms (Lepore, 1997). However, an early expressive writing intervention benefitted individuals who had recently gone through a romantic break-up (Lepore & Greenberg, 2002), suggesting that a short and early intervention is also effective. Based on these findings, I hypothesize that an expressive writing intervention in response to the social threat of social exclusion will result in improved WMC.

Brinol et al. (2013) found that treating written thoughts as material objects can impact how the thoughts are used and processed. This suggests that expressive writing may be beneficial when meaning is given to the thoughts. Writing thoughts and physically discarding them reduced the influence of the thoughts on future judgments, whereas keeping the written thoughts lead to relying more on the thoughts (Brinol et al., 2013). Therefore, I hypothesize that physically discarding the recorded thoughts of an expressive writing intervention, may influence the benefits of expressive writing. Specifically, I predict that writing thoughts following social exclusion will reduce the

effects of exclusion on WMC, and that this will be most true when people retain, rather than discard, the written record of their thoughts.

Motivation and Rumination

Several mechanisms have been proposed to underlie the effects of social exclusion on reduced cognitive and social functioning. Motivational interventions such as a cash incentive reduce the negative effects of social exclusion (Baumeister et al., 2005; DeWall, Baumeister, & Vohs, 2008). These effects may not be restricted to self-control and may account for social exclusion effects on WMC. Therefore I hypothesize that motivation may be a potential mediator between social exclusion's negative effects on WMC.

Another line of research suggests that rumination may be a potential mediator responsible for social exclusion's effects on functioning rather than motivation. Rumination is compulsively focused attention on one's distress and the symptoms, causes, and consequences associated with the distress (Nolen-Hoeksema, Wisco, & Lyubomirsk, 2008). Individual differences in WMC predict rumination-related effects, such as mind-wandering during challenging tasks and the inability to suppress unwanted thoughts (Brewin & Beaton, 2002; Kane et al., 2007). This research suggests that rumination in response to social exclusion may divert mental resources away from the executive functions of WMC, reducing it, thereby explaining the effects of social exclusion on WMC.

Replicating the Effects of Social Exclusion on WMC

WMC is a key variable in various cognitive and social tasks (Barret, Tugade, & Engle, 2002). Individual differences in WMC predict variation in proactive interference

(Kane & Engle, 2000), which relates to performance on intelligence and working memory span tasks (Lustig, May, & Hasher, 2001). Individual differences in mind-wandering and thought suppression are linked to lower WMC (Brewin & Beaton, 2002; Brewin & Smart, 2005), which mediates WMC and reading comprehension (McVay & Kane, 2012) suggesting a connection to other intellectual tasks. Additionally, WMC predicts a number of cognitive-social skills, such as accuracy in following directions (Engle, Carullo, & Colling, 1991) and the ability to multi-task (Konig, Buhner, & Murling, 2005), which further suggests WMC is a basic mechanism underlying of social and cognitive functioning. This finding is consistent with the idea that impaired functioning underlies at least some of the negative effects of social exclusion (Baumeister, et al., 2005). Mischkowski and Crocker (under revision) propose that WMC accounts for the wide variety of effects of social exclusion, I hope to replicate and expand upon their findings.

The present study was designed with several aims in mind. First, it aimed to replicate the effects of social exclusion on WMC. Second, it aimed to test whether expressive writing ameliorates the effects of social exclusion on WMC, and whether that amelioration depends on whether written thoughts are retained or discarded. Third, it aimed to assess potential mediators of the effects of social exclusion on WMC, including motivation, rumination, and threatened needs.

Methods

Participants

Seventy-six Ohio State University undergraduate students (33 female) participated for partial credit toward their introductory psychology course requirement.

All participants were Native English speakers. The WMC task requires participants to remember English words while simultaneously counting vowels within an English sentence.

Procedure

Participants were tested in groups of three to five. Participants gathered in a large room and gave consent for a study they were told would be investigating teamwork.

Social exclusion manipulation. An established manipulation of social exclusion was used (Twenge, et al., 2001; Williams, 2007). Participants first took part in an icebreaker activity in order to get to know each other. Participants received a sheet with suggested questions to facilitate discussion (e.g. *What is your major?*). The experimenter left for approximately 15 minutes, and then led participants to individual cubicles. Participants choose either one (if in a group of three) or two (if in a group of four or five) of the other participants as partners in the upcoming teamwork portion of the study.

Participants were randomly assigned to either a social exclusion or a non-exclusion (control) condition. Participants in the exclusion condition ($n=37$) learned, that “no one chose” them for the teamwork study and would “work on a different study alone.” Participants in the non-exclusion condition ($n=39$) learned that they “will not be doing the partner task for a while” and work on a different study. All participants completed “some pre-testing questionnaires and tasks for a different study.”

Expressive writing task. An established expressive writing task was used (Brinol et al., 2013). After the exclusion manipulation, participants were randomly assigned to an expressive writing and discard condition, an expressive writing and retain condition, or a non-writing (control) condition. In the expressive writing and discard condition ($n=24$),

participants recorded any “negative thoughts” regarding their experience in the experiment thus far. Participants wrote for approximately three minutes and instructed to throw away their thoughts “as a means of mentally discarding their thoughts.” In the expressive writing and retain condition ($n=26$), participants recorded any “negative thoughts” regarding their experience in the experiment thus far. Participants wrote for approximately three minutes and kept the sheet throughout the remainder of the experiment. Participants in the non-writing condition ($n=26$) did not record their thoughts, but continued with the experiment.

Reading span task. An established reading-span task (Schmader and Johns, 2003) was used to assess WMC. Participants completed two alternating computer based tasks. Participants saw a sentence and were instructed to count the number of vowels (e.g., *don't give the fish too much food*; the reading task). Then participants saw a short word (e.g., *blue, dress, house*) for 2 seconds to remember. At the end of a set consisting of four to six sentence-words pairs, participants recorded as many words they could remember (the span task). 60 sentence-word pairs were presented in 12 trials of four to six sentence-word pairs per trial. Following established procedures (e.g., Schmader and Johns, 2003), *absolute span scores*, which is the total number of words recalled in sets for which all words were recalled, were calculated. This task and scoring has been validated as a measure of WMC (Conway et al., 2005).

Need Threat Scale. Participants then complete a modified version of the Need Threat Scale, modified to correspond to the icebreaker activity rather than a game of Cyberball (Beest & Williams, 2006). The scale was used to check the exclusion manipulation. Participants indicated their agreement with items on the scale from 1

(*strongly agree*) to 7 (*strongly disagree*). The scale includes subscales measuring belongingness (e.g., *I feel a part of those I talked with*), control (e.g., *I feel like I affected the conversation*), self-esteem (e.g., *I feel that I had some value in the group*), and meaningful existence (e.g., *I feel that my presence was meaningful*). The scale also included an additional section on mood, participants responded to “the number that best represents the extent to which you feel (e.g., *good, friendly, angry*) right now” on a scale from 1 (*not at all*) to 5 (*extremely*). I averaged the items within the belongingness (Cronbach $\alpha=.89$), control (Cronbach $\alpha=.83$), self-esteem (Cronbach $\alpha=.81$), meaningful existence (Cronbach $\alpha=.86$), and mood (Cronbach $\alpha=.91$) subscales. I also averaged together the belongingness, control, self-esteem, and meaningful existence subscales to develop a composite need threat score (Cronbach $\alpha=.85$)

Hurt Feelings. Participants completed questions related to hurt feelings to assess the effects of expressive writing. Hurt feelings was used as a secondary manipulation check. Participants were asked, “how did you feel when you were told that you were going to work on a filler task or another study?” Participants respond on a scaled from 1 (*not at all*) to 7 (*extremely*) to what extent “at that moment, I felt (e.g., *hurt, pained, wounded*).” These items were averaged into a measure of hurt feelings (Cronbach $\alpha=.95$).

Ruminative Response Scale. Participants completed an adapted Ruminative Response Scale (Treynor, Gonzalez, and Nolen-Hoeksema, 2003) to correspond to thoughts they have had since the group activity. Participants were asked to what extent a statement (e.g., *Why do I always react this way?*) applies to them “since the end of the group activity” on a scale from 1 (*almost never*) to 4 (*almost always*). I averaged these items into a rumination measure (Cronbach $\alpha=.72$).

Motivation. Lastly, participants completed an adapted subscale of the Dundee Stress State Questionnaire designed to assess motivation following a task (DSSQ; Matthews et al, 1999). Participants rated their attitude towards a statement (e.g. *I want to succeed on the task*) in regards to the reading span task, on a scale from 1 (*not at all*) to 5 (*extremely*). The scale contains subscales measuring success motivation (e.g. *I was concerned about not doing as well as I can*), intrinsic motivation (e.g. *Doing the task was worthwhile*), and overall motivation (e.g. *I want to succeed on the task*). I rescored and averaged the items within the success motivation (Cronbach $\alpha=.86$), intrinsic motivation (Cronbach $\alpha=.77$), and overall motivation (Cronbach $\alpha=.84$) subscales. There was also a single-item measure of motivation within the questionnaire (e.g. *I was motivated to do the task*).

Results

Means and standard deviations for all dependent measures are included in Table 1. One-way analyses of variance (ANOVAs) showed that the experimental conditions did not differ on gender or race ($ps \geq .52$). To account for variability in our dependent variables, I included gender and race as covariates in all subsequent analyses. As a consequence, I used analysis of covariance (ANCOVA) to test mean differences between the experimental conditions on the dependent variables. Preliminary analyses found that the two writing conditions did not differ significantly on any dependent measures. Therefore, I collapsed the two writing conditions into one, resulting in a 2 (Exclusion condition) X 2 (Writing Condition) design. I tested mediation and indirect effects using multiple regressions and bootstrapping.

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I performed ANCOVAs to test for the interactions and main effects of social exclusion and writing on the dependent measures. See Table 1 for the results. To analyze the effects on the dependent variables within the conditions, I used planned contrasts through the L-Matrix command in SPSS. See Table 2 for specific contrasts, and Table 3 for the results.

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Table 1.

<i>ANCOVAs for the Main Effects and Interaction of Exclusion and Writing</i>						
Dependent Variable	Exclusion		Writing		Exclusion by Writing	
	<i>F</i>	<i>M (SD)</i>	<i>F</i>	<i>M (SD)</i>	<i>F</i>	<i>M (SD)</i>
WMC	0.01	37.92 (15.00)	0.39	39.04 (14.07)	10.86**	38.65 (14.31)
Need Threat Scale						
Belongingness	5.83*	4.56 (1.37)	1.72	4.82 (.97)	0.16	4.73 (1.12)
Control	2.76	4.95 (.90)	0.16	4.75 (1.05)	0.17	4.82 (1.00)
Meaningful Existence	1.21	4.42 (.65)	1.14	4.56 (.64)	0.12	4.51 (.65)
Self-Esteem	2.23	4.88 (1.26)	0.78	5.02 (1.00)	1.91	4.98 (1.09)
Composite	4.22*	4.70 (.92)	0.70	4.79 (.77)	0.44	4.76 (.82)
Mood	1.08	3.75 (.69)	0.33	3.84 (.68)	0.50	3.81 (.68)
DSSQ						
Success Motivation	0.55	3.30 (.80)	2.37	2.96 (.83)	0.91	3.07 (.83)
Intrinsic Motivation	2.11	2.99 (.63)	0.00	3.05(.82)	0.19	3.02 (.75)
Overall Motivation	1.87	3.42 (.83)	3.625†	2.98 (.88)	1.46	3.13 (.89)
Single-Item Measure	2.55	3.23 (1.18)	0.62	2.96 (1.17)	4.54*	3.05 (1.17)
RRS	1.60	1.33 (.57)	0.00	1.38 (.43)	0.17	1.36 (.48)
Hurt Feelings	4.37*	2.08 (1.42)	0.00	2.11 (1.52)	0.42	2.10 (1.48)

Note. Analyses controlled for race and gender. * = $p < .05$. ** = $p < .01$

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Table 2

<i>L-Matrix Planned Contrasts</i>				
	Exclusion/ Non-Writing	Exclusion/ Writing	Non-Exclusion/ Non-Writing	No Exclusion/ Writing
Exclusion vs. Control within Non-Writing (C1)	1	0	-1	0
Exclusion vs. Control within Writing (C2)	0	1	0	-1
Writing vs. Non- Writing within Exclusion (C3)	1	-1	0	0
Writing vs. Non- Writing within Control (C4)	0	0	1	-1

Table 3.

<i>Planned Contrasts Analyses of Dependent Variables</i>				
	C1	C2	C3	C4
Dependent Variable	<i>t</i>	<i>t</i>	<i>t</i>	<i>t</i>
WMC	2.11*	2.71**	2.71**	1.95†
Need Threat Scale				
Belongingness	1.75	-1.67	1.17	-0.66
Control	1.29	-0.96	0.00	0.59
Meaningful Existence	0.46	-1.20	0.49	-1.03
Self-Esteem	1.81	-0.07	1.57	0.38
Composite	1.70†	-1.15	1.04	-0.12
Mood	0.20	-1.46	-0.09	-0.93
DSSQ				
Success Motivation	1.06	0.18	0.40	1.81
Intrinsic Motivation	-0.63	1.57	0.28	0.35
Overall Motivation	1.61	-0.12	-0.48	2.26*
Single-Item Measure	2.33*	0.46	0.93	2.12*
RRS	-1.05	0.70	-0.26	0.33
Hurt Feelings	-0.90	2.27*	0.44	0.47

Note. C1 = the exclusion condition vs. the control condition within the non-writing condition. C2 = the exclusion condition vs. the control condition within the writing condition. C3 = the writing condition vs. the non-writing condition within the exclusion condition. C4 = the writing condition vs. the non-writing condition within the control condition.

Manipulation Checks

As hypothesized, social exclusion increased the experience of threatened needs (see Table 1 and Figure 1), suggesting that the exclusion manipulation was effective. There was no significant effect of writing or interaction between social exclusion and writing on need threat (see Tables 1 and 3).

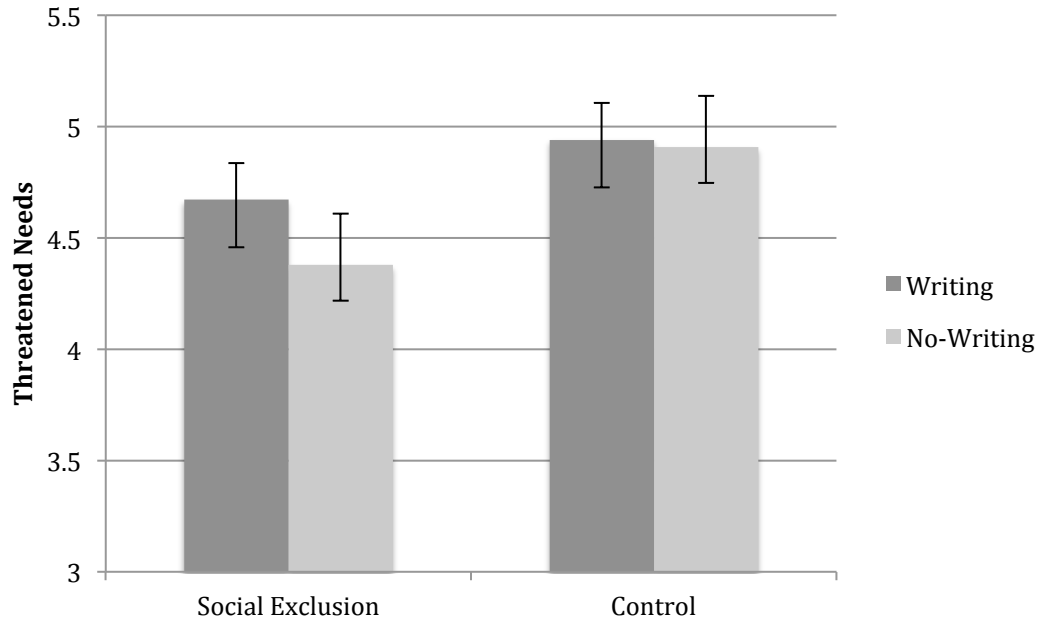


Figure 1. Need Threat Scale composite by social exclusion and writing conditions.

Capped vertical bars denote 1 SE.

ANCOVA also showed a main effect of exclusion on hurt feelings (see Table 1). As hypothesized, social exclusion increased the experience of hurt feelings. There was no significant main effect of writing on hurt feelings and no significant interaction between social exclusion and writing on hurt feelings (see Tables 1 and 3).

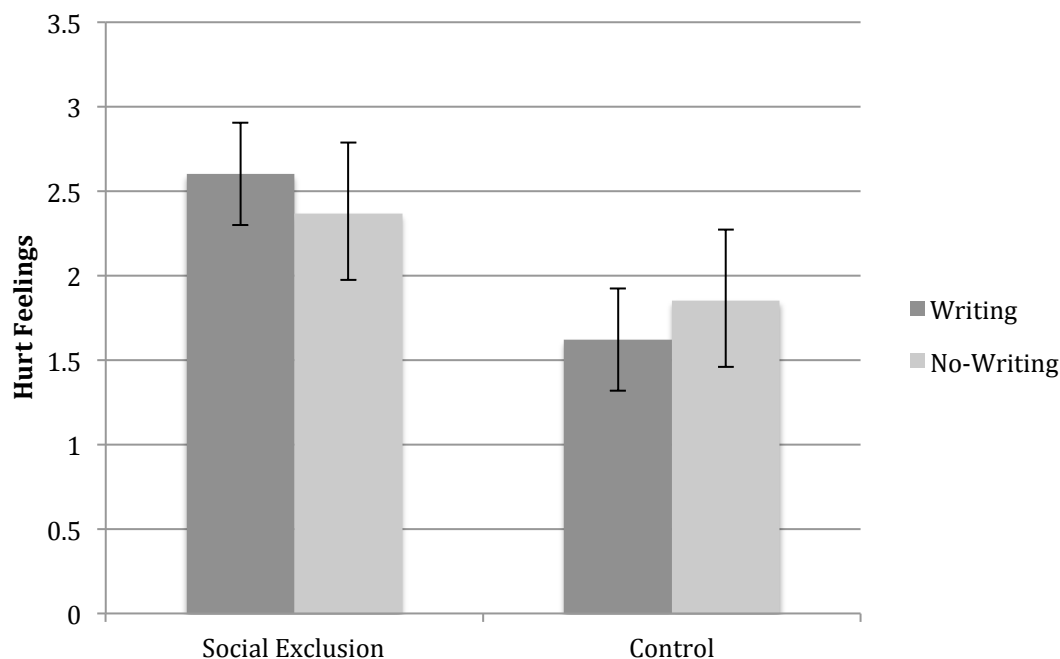


Figure 2. Hurt Feelings by social exclusion and writing conditions.

Working Memory Capacity

As Table 1 shows, neither social exclusion nor expressive writing had a main effect on WMC. However, there was a significant Exclusion X Writing interaction. To probe the interaction further we tested individual contrasts. First, within the non-writing control condition, excluded participants scored lower on WMC than non-excluded participants. Within the writing condition, excluded participants scored higher on WMC than non-excluded participants. Furthermore, within the social exclusion condition, participants in the writing condition scored higher than those in the non-writing control condition, whereas within the control condition, participants in the writing condition scored marginally lower than those in the no writing condition (See Table 3 and Figure 3). Thus, as hypothesized, expressive writing alleviated the effects of social exclusion on WMC.

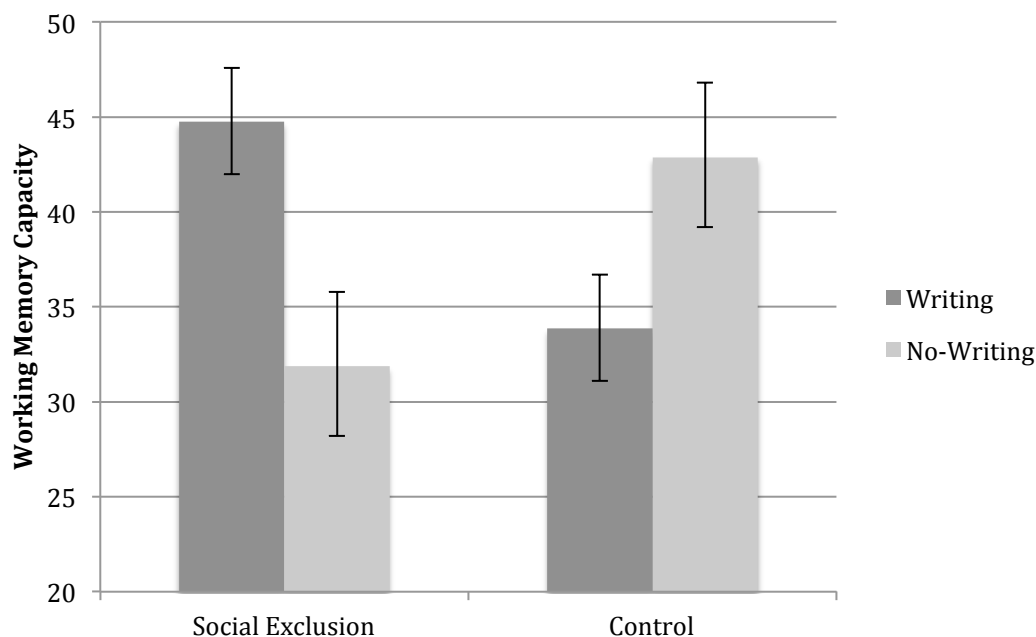


Figure 3. Working Memory Capacity means by social exclusion and writing conditions.

Motivation

As hypothesized, on the single-item motivation measure there was no main effect of writing or exclusion, but there was a significant interaction between social exclusion and writing (see Table 1). To probe the interaction further, we tested individual contrasts for the single-item motivation measure; within the non-writing control condition, there was a significant decrease in motivation in the social exclusion condition relative to the control condition; additionally, within the non-exclusion control condition, there was a significant decrease in motivation in the writing condition relative to the non-writing control condition (See Table 3 and Figure 4). In sum, expressive writing alleviated the effects of exclusion on motivation.

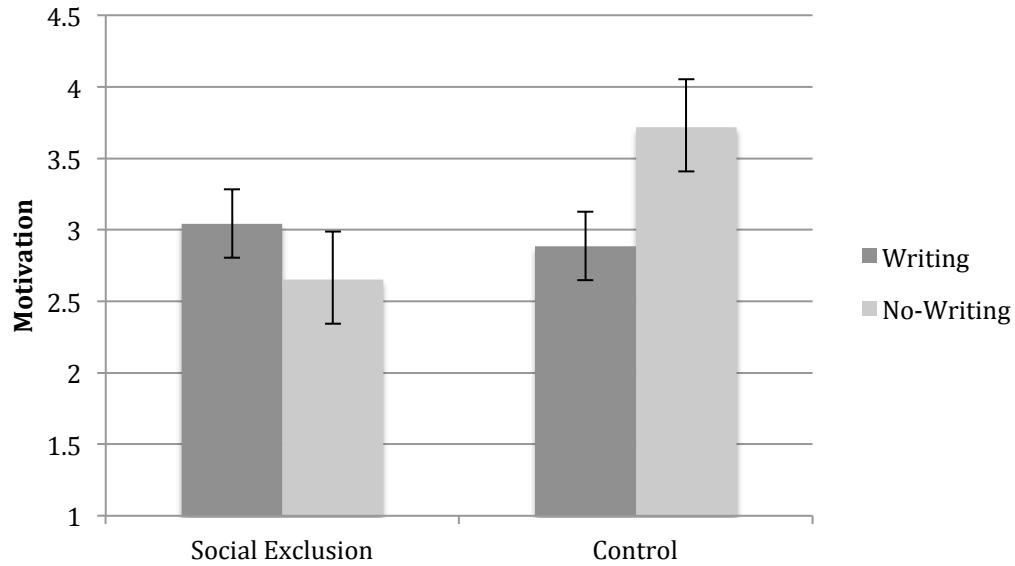


Figure 4. Single-item motivation measure by exclusion and writing conditions.

There were no significant main effects or interactions on overall motivation or any of the subscales, although the pattern was similar to that for the single item measure (see Table 1).

Ruminative Response Scale

Unexpectedly, expressive writing did not alleviate the effects of exclusion on rumination; there were no significant interactions or main effects of social exclusion or writing on rumination (see Table 1 and Figure 4).

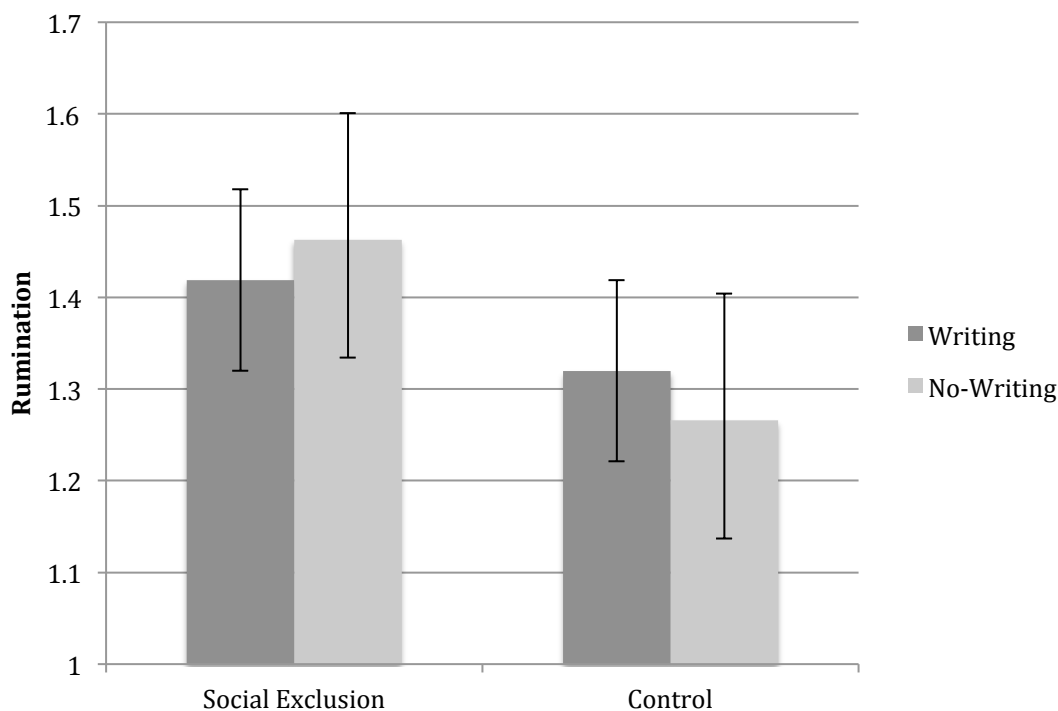


Figure 4. Rumination by exclusion and writing conditions.

Mediation Analyses

Because motivation and rumination were predicted as potential mediating variables between social exclusion and WMC, I conducted multiple regression analyses controlling for race and gender. I restricted the sample to the non-writing conditions for the subsequent analyses. To test the indirect effects through motivation, I used the bootstrapping test option of the PROCESS macro for SPSS (Hayes, 2012). I drew 5000 bootstrapping samples to construct a bias-corrected confidence interval around the indirect effect of social exclusion on WMC through motivation. The 95% bootstrapping confidence intervals (95% BTCIs [-13.458, .883]) overlapped with zero, suggesting that motivation does not account for the effects of social exclusion on WMC.

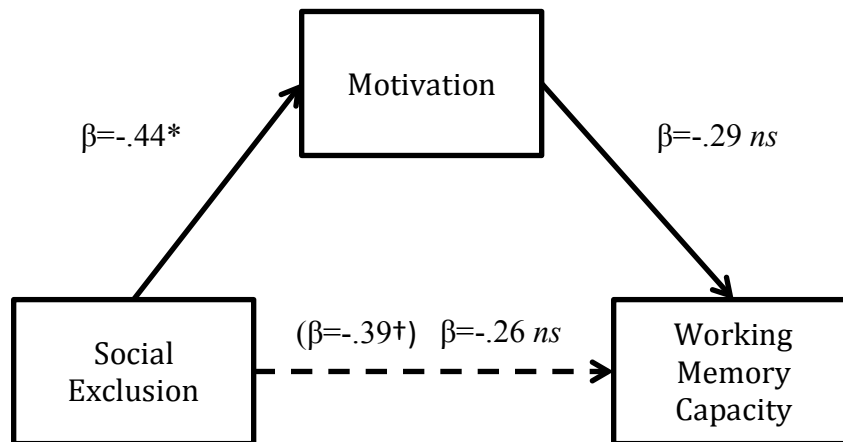


Figure 7 – The mediation model of the relation of social exclusion and working memory capacity by motivation for participants in the non-writing condition.

Then I tested rumination as a potential mediator. Additionally, to test the indirect effects through rumination, I used the bootstrapping test option of the PROCESS macro for SPSS (Hayes, 2012). I drew 5000 bootstrapping samples to construct a bias-corrected confidence interval around the indirect effect of social exclusion on WMC through rumination. The 95% bootstrapping confidence intervals (95% BTCIs [-14.560, 2.843]) overlapped with zero, suggesting that rumination does not account for the effects of social exclusion on WMC.

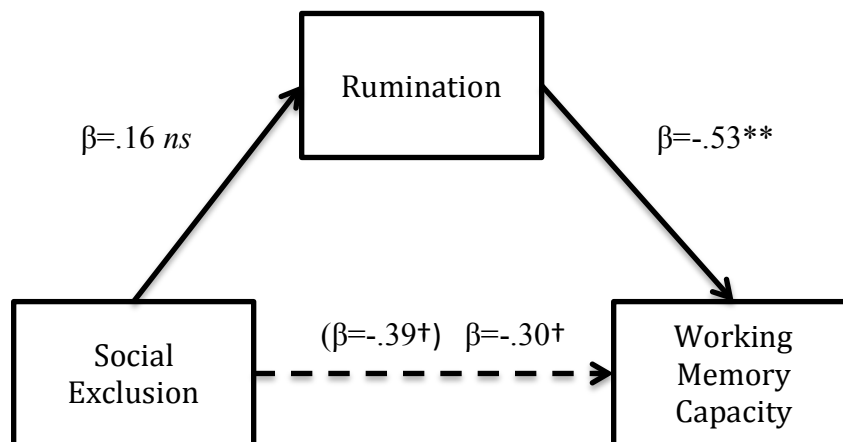


Figure 8. The mediation model of the relation of social exclusion and working memory capacity by rumination for participants in the non-writing condition.

Discussion

There are three major findings from this experiment. First, social exclusion reduces WMC. Second, expressive writing alleviates the effects of social exclusion on WMC. Third, social exclusion decreases motivation and rumination, but neither variable accounted for social exclusion effects on WMC. These findings have significant implications both theoretically and practically, and raise a number of possibilities for future research.

Theoretical and Practical Implications

To my knowledge, this is the first study to show that expressive writing can alleviate the effects of social exclusion on WMC. This finding has a number of theoretical and practical implications. Theoretically, these findings can be explained through a number of different models. Williams' (1997, 2001, 2007) temporal model of ostracism suggests that experiencing exclusion leads to an automatic response, which is followed by a reflective reaction. Williams proposes that in response to exclusion, the

following sequence is followed; first an initial painful response to ostracism, followed by threats to various needs such as belongingness and control, and ending with a reflective stage in which one cognitively assess the exclusion and processes the effects. I speculate that expressive writing allows one to quickly arrive at the last reflective stage, allowing one to process the exclusion faster thereby overcoming the negative effects of exclusion.

Alternatively, Pennebaker proposes two theories to explain the effects of expressive writing (1989, 1997). The first theory suggests that not talking about thoughts and feelings is a type of psychological work called inhibition, which leads to disturbances in functioning (Pennebaker, 1989, 1997). Expressive writing may allow one to let go of the thoughts and feelings they recorded, thus reducing the disturbances in functioning caused by inhibition. I speculate that in response to being excluded, one is more likely to inhibit their thoughts and feelings. This inhibition places more work and stress upon the individual, thereby accounting for WMC deficits. Expressive writing reduces this inhibition, thus alleviating the stress and improving functioning and WMC. Alternatively, Pennebaker's other theory proposes that through expressive writing, a cognitive narrative is developed that produces the positive effects. When writing, one develops a coherent narrative of the topic, which allows the writer to process and explain the trauma. After being excluded, participants may develop a narrative through the expressive writing intervention, as a result processing the threat and returning to normal functioning.

Another theory, which could potentially explain these effects, is Wilson and Gilbert's (2008) theory of affective adaptation. They suggest that through continued exposure to an emotional event, one eventually becomes accustomed to it and experiences the event less strongly over time. I speculate that after being excluded the

initial pain of rejection is severe and reduces functioning. Expressive writing may force one to relive the pain of social exclusion, but as a result they experience it less severely, allowing them to continue functioning normally.

Other implications relate to the methods and effectiveness of an expressive writing intervention. My findings suggest that expressive writing may be a much more powerful intervention than previously thought. While the clinical application of expressive writing is well documented (Frattaroli, 2006), this is the first study to show that expressive writing is able to intervene not just in recalled social threats, but in actual social threats. Because expressive writing is able to alleviate the negative effects of social exclusion, expressive writing may be able to produce similar results in response to other social threats as well. Based on Pennebaker's inhibition model (1989, 1997), social threats may produce deficits through inhibition. Expressive writing would assist in overcoming this inhibition, thus improving functioning. Alternatively, through Wilson and Gilbert's theory (2008), expressive writing may alleviate the experience of the social threat through repeated exposure.

Additionally, the timing of expressive writing interventions could be implicated through my results. While expressive writing studies normally occur over multiple days and involve multiple writing sessions, my study is the first to show effects of expressive writing after a single writing session immediately after a social threat. This suggests that expressive writing therapy does not necessarily have to occur over a long time with multiple writing sessions, but can be a quick and immediate intervention as well.

This study failed to uncover the reason why social exclusion decreases WMC. Because neither motivation nor rumination were mediating variables, it is unlikely that

either has an impact on social exclusion's effects on WMC. However, I did find that social exclusion reduces motivation, which is consistent with previous findings connecting exclusion to motivation (Baumeister et al., 2005). Additionally, rumination's ability to predict decreased WMC provides support for the existing literature connecting rumination to deficiencies in WMC (Brewin & Beaton, 2002; Kane et al. 2007).

Lastly, my findings are consistent with Mischkowski and Crocker's (under revision) findings that social exclusion reduces WMC, adding to the reliability of my findings. Additionally, because WMC was impacted by the expressive writing intervention, the results suggests that WMC may be able to explain the effects of other expressive writing tasks and various factors associated with expressive writing, such as inhibition or constructing a cognitive narrative (Pennebaker, 1997). These results also support the idea that WMC is a fundamental psychological mechanism for a variety of cognitive and social processes.

Practically, these results suggest that expressive writing may be able to provide immediate support to variety of social threats and crisis situations, and in general may have the potential to have a significant impact outside of a clinical setting. One experiencing suicidal thoughts may benefit from a short and immediate expressive writing intervention, rather than the traditional intervention.

Limitations

There were several limitations to this study. First, I simply measured motivation and rumination rather than manipulate it; therefore I couldn't make any causal claims regarding motivation or rumination. Additionally, the cell sizes for the non-writing

conditions were fairly small. As a result, we may not have had enough participants to detect a mediation effect of motivation or rumination.

Future Directions

These results raise a number of potential directions for future research. It is still unclear why expressive writing alleviates the effects of social exclusion; further research should be directed towards discovering the underlying process variables. Pennebaker's theory (1997) on expressive writing suggests that reduced inhibition from expressive writing could explain the positive effects. Alternatively, repeated exposure to the social exclusion may allow one to adapt to the pain of social exclusion, suggesting that multiple expressive writing sessions would produce greater benefits. Support for this exists within a clinical setting (Murray & Segal, 1994; Fratarolli, Borod, & Lepore, 2004). Future studies could study inhibition and affective adaptation as potential process variables in the relationship between social exclusion and WMC.

Further research should also be directed towards the methods and effectiveness of a short and immediate expressive writing intervention. I found that expressive writing can alleviate the effects of social exclusion, but it is not clear whether this would translate to others social threats and traumas. Stereotype threat and social exclusion have many similar effects, such as lowering WMC (Schmader & Johns, 2003; Schmader, Johns, & Forbes; Mischkowski & Crocker, under revision), and leading people to question their belonging (Walton & Carr, 2012). Even though social exclusion and stereotype threat are different conceptually, they have similar cognitive and social impacts. This suggests that expressive writing may offer similar benefits to one impacted by stereotype threat as one threatened by social exclusion.

Additionally, the methods of the actual intervention must also be assessed.

Further research could compare the benefits of the short and immediate intervention to the benefits of the traditional long expressive writing intervention. For example, would the short and immediate intervention be able to alleviate depressive symptoms (Lepore, 1997) or the pain of a romantic break-up (Lepore & Greenberg, 2002) as traditional expressive writing manipulations have done. Research should be devoted to expanding upon how the effectiveness a short and immediate expressive writing intervention.

Furthermore, this research raises questions regarding the role motivation and rumination has in social exclusion's effects on WMC. This study only measured motivation and rumination; therefore we were unable to make causal claims related to these variables. Future studies could manipulate these variables, allowing for a clearer understanding of the causal influence these variables may have on the relationship between social exclusion and WMC.

It is still unclear why social exclusion impairs WMC. Our results suggest that neither motivation nor rumination is responsible. One potential explanation for social exclusion's negative effects may be due to the physiological stress response, specifically cortisol. Cortisol is a glucocorticoid hormone that interferes with declarative memory and cognitive performance when elevated (Kirschbaum, Wolf, May, Wippich, Hellhammer, 1996). Social exclusion elevates cortisol (Blackhart, Eckel, & Tice, 2007), suggesting that cortisol may account for the negative effects of exclusion on cognitive performance and social behavior. Further research should be devoted to clarifying the relationship between social exclusion and WMC.

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In addition, these findings have wider implications for the practical use of expressive writing as a whole. The majority of expressive writing research occurs in response to a serious trauma, and occurs over a number of days and for a significant amount of time (Pennebaker & Beall, 1986; Chung & Pennebaker, 2008). Our findings suggest that expressive writing may be a much more powerful intervention than previously thought. Expressive writing was able to alleviate an actual threat, and produce benefits after a single, brief intervention. To our knowledge no other intervention has been this brief and produced significant results. Further research should devote itself to understanding the extent to which expressive writing can have beneficial effects.

Conclusion

Social exclusion can have detrimental impacts on cognitive and social functioning, limiting the ability of the excluded to function properly (Baumeister & DeWall, 2005; Williams, 2007). An expressive writing intervention can alleviate these negative effects and improve cognitive functioning. This is the first study to show positive effects of expressive writing after a short, single intervention. This study suggests that expressive writing may be a much more powerful intervention that can impact other social threats quickly and efficiently.

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Appendix

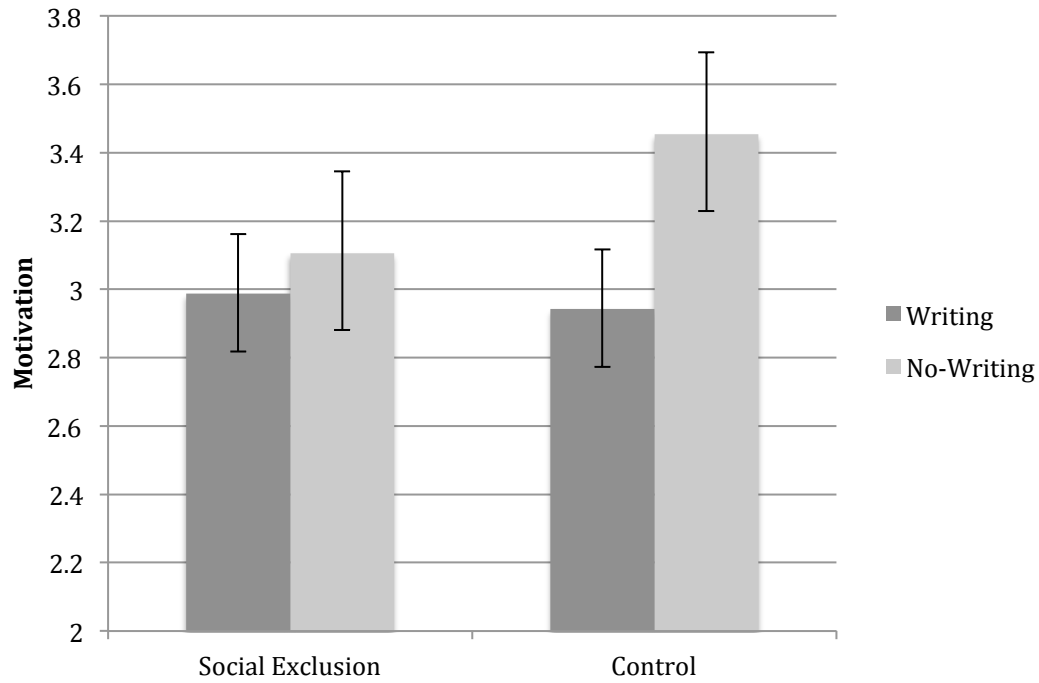


Figure A1. Success motivation by social exclusion and writing conditions.

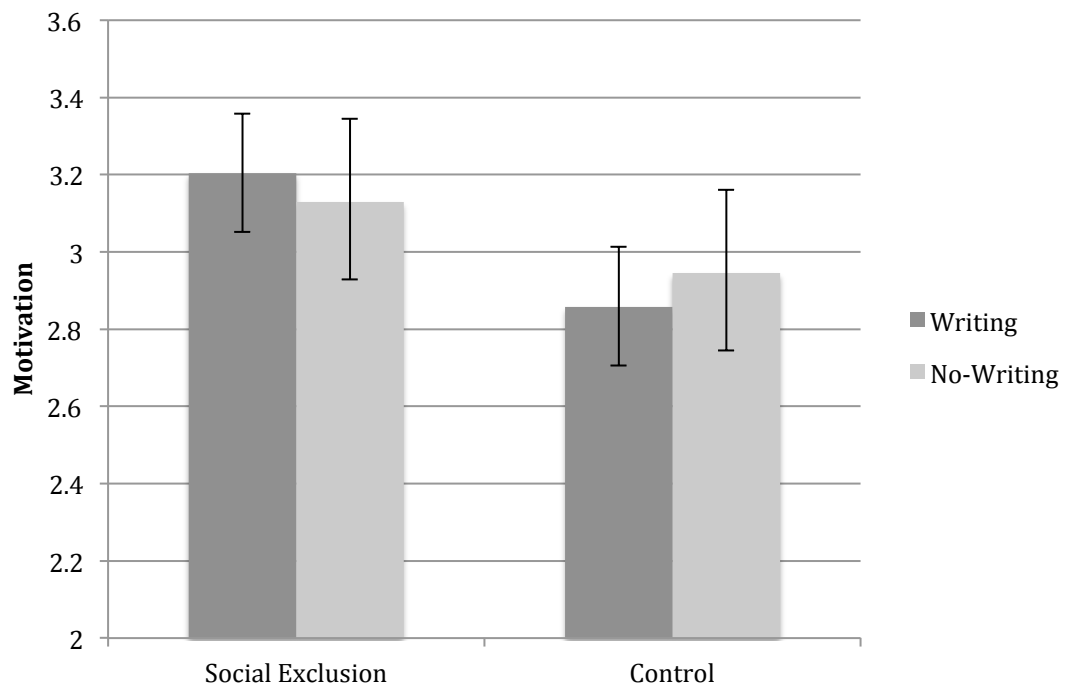


Figure A2. Intrinsic motivation by social exclusion and writing conditions.

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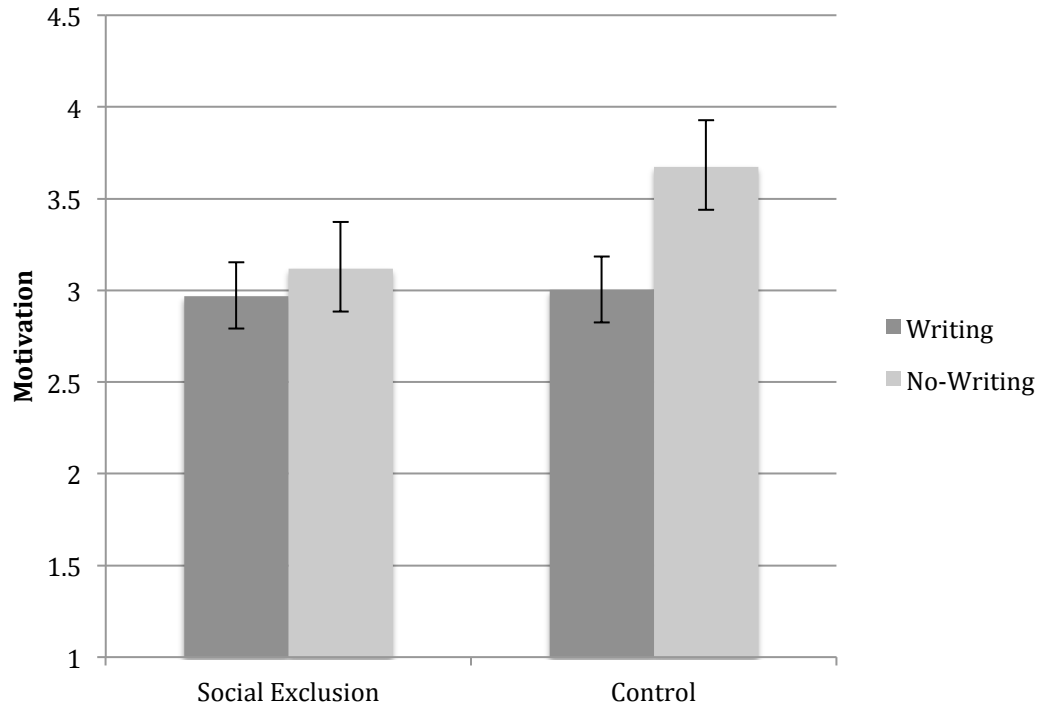


Figure A3. Overall motivation by social exclusion and writing conditions.

Table A.

<i>Correlations Between the Dependent Variables</i>						
	WMC	Need-Threat	Mood	Motivation	Rumination	Hurt Feelings
WMC	1	0.13	0.01	0.21 [†]	-0.23 [*]	0.04
Need-Threat		1	.62 ^{***}	0.11	-.52 [*]	-.29 ^{**}
Mood			1	-.03	-.38 ^{**}	-.30 ^{**}
Motivation				1	.04	.09
Rumination					1	.27 [*]
Hurt Feelings						1

Note. Analyses controlled for race and gender. * = $p < .05$, ** = $p < .01$, *** = $p < .001$